



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/651,783	08/30/2000	Shuichi Kanno	NIP-198	2461
24956	7590	11/29/2007	EXAMINER	
MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.			NGUYEN, NGOC YEN M	
1800 DIAGONAL ROAD			ART UNIT	PAPER NUMBER
SUITE 370			1793	
ALEXANDRIA, VA 22314			MAIL DATE	DELIVERY MODE
			11/29/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	09/651,783	KANNO ET AL.
	Examiner	Art Unit
	Ngoc-Yen M. Nguyen	1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 12 September 2007.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 3,4,11-14,16 and 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 3-4, 11-14, 16-17 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 3-4, 11-14, 16-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants are requested to point out support in the instant specification, by page and line numbers, for the limitation of "decomposing a toxic component containing at least one of SO₃, HF, NO, NO₂, ... produced by said decomposition of PFC ... at the rear stage of said PFC decomposition process". It should be noted that in the instant specification, it is disclosed that SF₆ and NF₃ are decomposed into SO₃, HF, NO, NO₂ (note equation 1 and 2 on page 4) and these decomposition products "can be removed from the decomposed gas by washing with water or an alkaline aqueous solution" (note page 4, lines 11-13), not by contacting with "a toxic component removing catalyst". Also, on page 12 of the instant specification, it is disclosed that PCF decomposition catalyst 8 and hazardous component removing catalyst 9 are packed into the PFC decomposition tower 1 and the hazardous component here means CO, SO₂F₂, and the

like (note page 12, lines 3-8 and page 14, lines 18-25 which mention "SO₂F₂ decomposition catalyst"). There is no disclosure in the instant specification to indicate that the "decomposition products" from decomposing PFC and the "hazardous component" are the same, i.e., there is no disclosure to show that CO and SO₂F₂ are obtained after decomposing a PFC gas that contains at least one of SF₆ and NF₃. There is no support in the instant specification for the two-step decomposing process as now required in the instant claims.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-4, 11-14, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 885 648 in view of JP 11-216,455 and Lang et al (6,235,256).

EP '648 discloses a process for decomposing fluorine compounds, comprising the steps of contacting a gas flow containing the fluorine compounds, which comprises fluorine as a halogen element, and any of the elements carbon, nitrogen and sulfur as a compound with the fluorine, with a fluorine compound-decomposition catalyst in the presence of steam to hydrolyze the fluorine compound in said gas flow, wherein said gas flow containing said fluorine compounds is contacted with a catalyst comprising Al to convert said fluorine compounds to hydrogen fluoride (note claim 1). In the equation

4 and 5 on page 3 of EP '648, when SF₆ or NF₃ is being decomposed, SO₃ or NO is formed. In the embodiments 6 and 7, SF₆ or NF₃ is diluted with air or nitrogen, the resulting gas is contacted with a catalyst to decompose the fluorine compound. The decomposed gas is scrubbed in an alkaline scrubber (note page 10, lines 1-25).

EP '648 discloses that sulfur oxides such as SO₂, SO₃ and the like, and nitrogen oxides, such as NO, NO₂, and the like, are generated in some cases. In order to neutralize and eliminate these products, a method of scrubbing the decomposed gas by spraying an aqueous alkaline solution is desirable (note paragraph bridging pages 3-4). Thus, the scrubbing step is considered as the step of removing SO_x and NO_x from the washed gas.

For the second "decomposing" step, i.e. "decomposing a toxic component...at the rear stage of said PFC decomposing process", this claim is read in light of the specification that there are two separate catalysts, i.e. catalyst "8" and catalyst "9", to remove different components in the PFC gas simultaneously in a single process step (note instant specification, page 14, under "(Embodiment 1)". EP '648 discloses that the stream to be treated can contain more than one fluorine compound and the catalyst can contain at least one element selected from the group consisting of Zn, Ni, Ti, Fe, Sn, Pt, Co, Zr, Ce, and Si in addition to Al (note page 3, lines 8-15). Thus, when more than 1 element was used in addition to Al, the first element with Al is considered as the claimed "decomposition catalyst" and the second element with Al is considered as the claimed "toxic component decomposition catalyst".

The difference is EP '648 does not disclose the step of removing SO_x or NO_x from the decomposed gas after scrubbing by passing the gas after the scrubbing step through a cyclone or demister.

JP '455 discloses a process for treating an exhaust gas generated in a process of making printed circuit board by passing the exhaust gas through a catalytic thermal decomposition device 4 and the waste gas cleaning device 5 and discharged as a harmless exhaust gas 6 (note English abstract). As shown in Figure 3, the exhaust gas after scrubber 5 is introduced into a cyclone 8. Here the moisture within the exhaust gas is removed and recycled back to the scrubber 5 thereby minimizes the requirement of fresh scrubbing liquid. JP '455 further teaches that a demister can be used instead of a cyclone (note paragraph 0036).

For the limitation of " the removed mist is then drained through a liquid waste outlet... in the emission said of said gas exhausted in said exhausting step", since JP '455 desires to recycle the moisture back to be used as scrubbing liquid, it would have been obvious to one skilled in the art to recover such moisture in the form of a liquid and it would also have been obvious to one skilled in the art to repeat the moisture removing step and to select proper equipment to effectively recover and recycle as much as possible of the moisture in the exhaust gas. It would have been obvious to one skilled in the art to provide a storage tank or a buffer tank to store the recovered moisture in order to accumulate enough moisture for the recycling step or to compensate for the fluctuation in the amount of moisture recovered.

For the instant claim 16, it would have been obvious to one of skill in the art to optimize the inlet velocity to effectively remove the moisture from the exhaust gas and to select an appropriate material for the construction of the cyclone to withstand the condition of the process.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to pass the exhaust gas after the scrubbing step in EP '648 to a cyclone or demister, as suggested by JP '455, because by doing so, the moisture can be removed from the gas and recycled to the scrubber thereby minimizes the requirement of fresh scrubbing liquid. Such step would inherently remove any remaining NO_x or SO_x from the washed gas.

Lang '256 is further applied to disclose a process for scrubbing acid gases, in which, the improvement is a demister arranged at a location after the liquid droplets have been sprayed by the spray means into the flow path of the flue gases (note column 3, lines 8-43 and claim 1). The demister can be a two-level demister, i.e. two demisters (note column 2, lines 36-38 and claim 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to pass the exhaust gas of EP '648 to a demister, as suggested by Lang '256 in order to obtain the advantages as disclosed in Lang '256 (note, for example, column 1, lines 44-50).

Claims 3-4, 11-14, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanno et al (PGPub US 2001/0001652) in view either JP 11-216,455 and Lang et al (6,235,256).

Kanno '652 is an US counterpart of EP '648.

Kanno '652 discloses a process as mentioned for EP '648 (note claim 1, Examples 11-12).

The difference is Kanno '652 does not disclose the step of removing NO_x or SO_x after the scrubbing steps.

JP '455 and Lang are applied to teach the step of passing the gas after the scrubbing step to a cyclone or demister.

Applicant's arguments filed September 12, 2007 have been fully considered but they are not persuasive.

Applicants argue that as shown in Figure 1, it is clearly shown that PFC is decomposed first at the PFC decomposition catalyst 8 into hazardous substances such SO₃, HF, NO, NO₂, CO, SO₂F₂, and then such substances are decomposed at the hazardous component removing catalyst 9.

Granted that PFC is decomposed first at the PFC decomposition catalyst, but the decomposition products such as SO₃, HF, NO, NO₂ are not disclosed in Applicants' specification as "hazardous components" and the disclosed hazardous components CO, SO₂F₂ are not produced by the decomposition of PFC. Also, it is disclosed in Applicants' specification that the "decomposition products" (i.e. , HF, NO, NO₂) are

removed by "washing with water or an alkaline aqueous solution at a washing tower", (note page 4, lines 11-13), these "decomposition products" are not subjected to a second decomposition step. Applicants' specification may provide support for the use of two different catalysts, the first one (catalyst 8) is for decomposing PFC components in the gas and the second one (catalyst 9) is for decomposing "hazardous components" (such as CO, SO₂F₂) in the gas. No component in the gas was subjected to two different decomposition steps.

Applicants argue that on page 12, lines 3-8 of the Applicants' specification, it is disclosed that "[T]he hazardous component here means CO, SO₂, F₂ and the like".

It should be noted that the hazardous component means "CO, SO₂F₂" (not CO, SO₂, F₂) as stated in Applicants' argument. Granted that the "hazardous component" can be CO, SO₂F₂, however, the hazardous component was not disclosed in Applicants' specification as being the same as the "decomposition products" or "toxic component" as required in Applicants' claims. It should be noted that the "toxic component" as required in Applicants' claims are obtained by decomposing a PFC gas, which can be HF, NO, NO₂ (note page 4, lines 7-13), but not CO, SO₂F₂.

Applicants argue that none of the applied references disclose the step of draining each of the liquid discharged from the lower liquid waste outlet and the liquid discharged from the upper liquid outlet through separate piping connections extending from the lower liquid waste outlet and the upper liquid waste outlet, respectively, to a storage tank.

In the above rejection, JP '455 fairly teaches the use of a cyclone to recover the moisture in the exhaust gas after the decomposition step. It would have been obvious to one skilled in the art to recover the moisture from the cyclone as disclosed in the any known manner. The use of the two separate piping connections are considered as "apparatus" limitations, and given little weight unless such use provide unexpected results for the process of decomposition of PFCs. For the storage tank, since the amount of recovered moisture would fluctuated, it is expedient to one skilled in the art to provide a holding tank so that the recovered moisture can be stored before it is being reused in a controlled manner.

Applicants argue that JP '455 does not disclose any storage tank.

JP '455 fairly teaches that the mists or moisture removed by the cyclone, i.e., a mist separating apparatus, can be recycled back to the scrubber and it would have been well within the skill of the artisan to provide a storage tank to serve as a buffer tank in order to regulate the amount and/or rate of the recovered moisture back to the scrubber.

Applicants argue EP '648 that does not mention the step of washing the exhaust gas after the decomposition treatment of NF_3 or SF_6 with water or alkaline aqueous solution.

EP '648 clearly discloses the step of neutralize and eliminate the decomposition products, such as SO_3 , NO , NO_2 from the exhaust gas after the decomposition treatment with aqueous alkaline solution (note paragraph bridging pages 3-4).

Applicants argue that EP '648 does not recognize that the washing causes a part of the HF, SO₃, NO included in said decomposition product to form a mist accompanied with water.

In response to applicant's argument that in Applicants' claimed invention recognize the presence of the HF, SO₃, NO in the mist and the step of remove these components from the mist, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In this case, even if the applied references do not recognize the presence of HF, SO₃, NO in the mist, JP '455 still suggest another reason to remove the mist as stated above, thereby inherently removing the HF, SO₃, NO in the mist.

Applicants argue that Lang '256 does not the decomposition of NF₃, SF₆ and other limitations as required in Applicants' claims.

Lang is only applied to teach that two demisters can be used to effectively remove mists from exhaust gases.

Applicants argue that JP '455 does not disclose the decomposition of NF₃, SF₆, the washing of the gas.

JP '455 is not relied upon to teach these features. JP '455 is applied to teach the desire to use a demister, i.e. cyclone, to recover the moisture in the exhaust gas. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The rejection over Kanno '652 is maintained for the same reasons as stated above.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner is currently on a Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Ngoc-Yen M. Nguyen
Primary Examiner
Art Unit 1793

nmn
November 26, 2007